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A Survey of the Incidence and Causes of Mortality in Pigs
1.—Sow Survey

Veterinary Investigation Service,*
Ministry of Agriculture, Fisheries and Food

SUMMARY.—A survey carried out by the Veterinary Investigation Service in England and Wales during a 2-year period from 1956 to 1958 showed an average death-rate up to 8 weeks of age in 2,581 litters of 25.9 per cent. Eighty per cent. of the losses occurred before the end of the first week of life. Deaths in pigs over 2 months old were estimated to be less than 2 per cent. Examination of a representative sample of the pigs that died in the survey herds showed that the main causes of death varied in different age groups. The results of post-mortem and laboratory findings are presented in a series of tables and attention is drawn to those problems which warrant further study.

ONE of the features of post-war agriculture has been the expansion of the pig industry, the number of pigs kept on agricultural holdings in England and Wales having risen from around 1½ million in 1946 to 5¼ million in 1958. During the same period the contribution of the industry to the livestock economy of the United Kingdom rose from £26¼ m. to £170 m. Although this is an achievement of which the industry may well feel proud, output might nevertheless be a good deal higher were it not for the heavy wastage that occurs through disease and from other causes associated with management. It is generally accepted that most of this wastage occurs during the suckling period.

An indication of its extent is given in the annual reports of the National Pig Recording Scheme for 1954-6 inclusive. The pre-weaning percentage losses from birth to 8 weeks in recorded litters for the 4 half-yearly periods from October, 1954, to September, 1956, were 25.9, 22.1, 23.4, and 20.8, figures which suggest that pre-weaning losses in England and Wales are currently higher than in Northern Ireland (Gracey, 1955) and above the level found by Menzies-Kitchin in a pre-war survey in East Anglia (Menzies-Kitchin, 1937, 1938).

In a paper which he presented to the B.V.A. Annual Congress in 1955, Gracey gave the results of a survey carried out during 1954 to assess the incidence and causes of loss in pigs in Northern Ireland. The survey covered 395 holdings in the 6 counties. During the period of the survey, 13,635 piglets were born in 1,231 litters, the average number of piglets born in each litter being 11.0. The average litter size at weaning was 9.1, a loss of 1.9 piglets per litter, and the total loss 2,478 piglets, or 18.2 per cent. of the total number of piglets born. These losses included stillborn piglets, which accounted for 4.9 per cent. of the pre-weaning losses. Thus pre-weaning losses, in piglets born alive, accounted for 13.3 per cent., of which 5 per cent. was attributed to overlying by the sow and 3 per cent. to the fact that the piglets were either weakly at birth or undersized.

The last survey to be carried out in England was that of Menzies-Kitchin (1938) who reported an 18.1 per cent. mortality during the suckling period among 13,860 living piglets born in 1,475 litters in East Anglia. Nearly half the deaths were attributed to crushing by the sow.

Gracey reviewed the results of similar studies carried out in other countries. These showed an average pre-weaning mortality of around 20 per cent., although little distinction was drawn in some of the reports between losses from stillbirths and other causes respectively. One weakness of most surveys has been that where any attempt has been

* Reprints of this article can be obtained from the Director, Central Veterinary Laboratory, Ministry of Agriculture, Fisheries and Food, New Haw, Weybridge, Surrey.

made to correlate losses with cause, the diagnosis has generally rested with the farmer. The value of a survey is, however, materially increased if facilities can be provided for the examination of, at the least, a representative sample of the carcases. The survey then shows not only the extent of the losses but gives an indication of their cause, so that any subsequent research which is aimed at reducing their incidence can be directed into the right channels.

There has been a gradual increase during the last few years in the number of research workers who are studying the health aspects of pig production. There is, however, a lack of precise knowledge of the relative importance of various problems to guide them in selecting subjects for study and because of this, the Veterinary Investigation Service undertook a survey in order to make this information available. The survey has concentrated, for the most part, on losses occurring in the pre-weaning period.

A pilot survey carried out from 12 Veterinary Investigation Centres during the 12-month period starting in November, 1955, showed a pre-weaning mortality of 25.4 per cent., a finding which tended to confirm the figures given in the National Pig Records. A more extensive survey was started in November, 1956, which was designed not only to determine the extent of the losses during the suckling period but also their cause. This report deals with the results obtained during the 2-year period of this survey, which ended in October, 1958.

Survey Method

It is generally accepted that surveys should preferably be made on a randomly selected sample, the results of which are then acceptable as being representative of the whole. The use of this method has not, however, been universally successful, in that the less co-operative may tend to fall out, so that some degree of automatic selection can occur. Longwill (1952), who made a survey of pig losses on New Zealand farms during 1949 to 1951 inclusive, found that satisfactory records were available from only 29 per cent. of his original sample and from 41 per cent. of his second sample. He was therefore left with only one-third of his original sample. Gracey had a similar experience in his Northern Ireland survey, some 9.0 per cent. of the farms in his random sample being withdrawn for various reasons during the first year.

The herds in the present survey were not chosen by random sampling and the results are therefore open to criticism on that score. They were widely distributed in England and Wales and were selected to include herds of different sizes and breeds and with varying methods of management. A prerequisite was the willingness of the owners to co-operate.

Fifteen Veterinary Investigation Centres, 12 in England and 3 in Wales, took part in the survey. Each centre enlisted the co-operation of 2 or 3 pig farmers, who undertook to keep accurate litter records and to inform the centre of any fatalities. Arrangements were made for the laboratory examination of as many dead or ailing pigs as possible in order that the causes of death or illness might be determined. The results of laboratory examinations, together with other data, were recorded on specially designed punched cards.

Between 20 and 30 sows and their progeny were initially taken for study on each farm. Many of the sows were under supervision during the whole of the 2-year period. A few died and others were sold into other herds or were slaughtered on account of age or for other reasons. In order to maintain the number of sows, other sows or gilts in the same herds were brought into the survey as replacements. The total number of sows covered by the survey was 1,242, distributed within 37 herds. During the 2-year period of the survey, 2,581 litters were born, totalling 28,400 piglets, a litter average of 11.0. Both the National Pig Records and Gracey's survey in Northern Ireland show a similar litter average and they are therefore useful bases for comparison. The number of litters reared by the sows in the survey varied from 1 to 5, the distribution being as follows:—

Number of litters per sow ...	5	4	3	2	1	Totals
Number of sows	13	168	224	325	512	1,242
Total litters ...	65	672	672	650	512	2,581

Results

Analysis of Pre-weaning Losses—All Piglets

	Number	*Percentage*
Total piglets born ...	28,400	100
LOSSES		
Stillborn	1,716	6·04
Birth to 7 days ...	4,360	15·35
1 to 3 weeks	710	2·50
3 to 8 weeks	562	1·97
Total loss	7,348	25·86

These figures show that roughly one quarter of all pigs born failed to reach 8 weeks of age. The total loss at 25.9 per cent. is rather higher than in litters within the pig recording scheme and considerably higher than in litters of comparable size in Northern Ireland. It will be seen that most of the losses (82.6 per cent.) occurred before the end of the first week.

The percentage of piglets dead at birth is in close agreement with the findings of Gracey and with the National Pig Records. The former reported a stillbirth rate of 4.9 per cent. and the latter gave figures of 0.65 piglets stillborn per average litter of 11.0; a percentage of 5.9. In 24 litters all the piglets were dead at birth and, within herds, there was a tendency for a succession of sows to give birth to stillborn piglets. Thus in one herd 8 litters were all stillborn and 5 in another. This problem was made the subject of a separate investigation, the results of which have been presented by Saunders (1958).

The death-rate from birth to the end of the first week of life was over 15 per cent. and this is clearly the most critical period in a pig's life. In 25 litters all the piglets died before they were 1 week old and

again there was a tendency for a succession of litters within a herd to die in this way. Thus 6 litters died in one herd, 5 in another, and 3 in two other herds. Losses of this kind and from stillbirths resulted in 2 per cent. of the total pregnancies being completely profitless.

Losses in Live Piglets

Survey		
Number of litters	2,581	
Number of live piglets ...	26,684	
	Average litter size—live piglets	
	Sow Survey 1956–8	*National Pig Records** 1954–6
Average litter size		
At birth	10·3	10·35
At 3 weeks	8·3	8·55
At 8 weeks	8·1	8·3
Average loss ...	2·2	2·0
Percentage	21·1	19·0

* Means for four successive half-yearly periods.

The number of pigs surviving at 8 weeks of age indicates a loss of 2.7 to 2.9 of the total piglets born (including those dead at birth), compared with an average loss of 1.9 piglets in litters of similar average size in Northern Ireland. In other words, farms in the Northern Ireland survey reared nearly 1 piglet more per litter than did those in the present survey.

Relationship of Losses to Number of Piglets in Litter

Menzies-Kitchin (1937) was of the opinion that there appeared to be little advantage in obtaining very large litters at birth as this was largely discounted by high pre-weaning mortality. He recorded a progressive increase in the number of pigs surviving at 8 weeks up to a birth number of 12. This observation was confirmed by Gracey (1955). When the number of piglets born exceeded 12 Menzies-Kitchin found that the death-rate increased and in litters more than 15 in number some 40 to 50 per cent. died before 6 weeks of age. Longwill (1952) also reported a sharp increase in death-rate in litters exceeding 14 in number.

sharp rise in litters over 14 in number. This increase is mainly due to more of the piglets being dead at birth or dying during the first week of life. It is evident that there is little benefit to be obtained in aiming at litters of more than 14 in number.

A significant and disturbing feature which is brought out in this table is that, on the average, slightly less than 5 piglets were reared to 8 weeks in the group in which the number born was 8 or fewer, which constituted approximately 20 per cent. of the litters.

Variation in Losses Within Herds

Although the average pre-weaning loss in the survey herds was 25.9 per cent., the losses in individual herds varied within very wide limits. The lowest recorded mortality rate was 4.1 per cent., in a herd in which 29 litters were born during the survey period, and the highest 40 per cent., in a herd in which 32 litters were born. It was thought that these wide differences might be related to the size of the herd, in that sows and litters in smaller herds might receive more attention. An analysis of the data, however (Table II), shows that the percentage loss is very much the same irrespective of the size of the unit, the variations in mortality rates occurring within the groups rather than being a reflection of the size of the unit.

TABLE II
INCIDENCE OF LOSSES IN RELATION TO SIZE OF ENTERPRISE

Litters born during survey	*Number of herds*	*Percentage loss*	*Range*
Less than 20 ...	3	18·3	14·01 to 25·95
20–50 ...	12	27·3	4·1 to 40·0
50–100 ...	16	25·6	12·6 to 37·5
100–150 ...	1	28·86	—
150–200 ...	3	24·7	19·0 to 28·1
200–250 ...	2	27·6	—

Seasonal Incidence of Losses

It is generally accepted that pre-weaning losses are heavier during the colder months of the year.

TABLE I
SHOWING RELATIONSHIP BETWEEN INCIDENCE OF LOSSES AND SIZE OF LITTER AT BIRTH

Number in litter at birth	Number of litters	Average	Percentage losses				Total percentage loss	Piglets born alive			
			Still-births	Birth to 7 days	1–3 weeks	3–8 weeks		Average litter size		Average loss	
								Birth	8 weeks	Number	Percentage
8 or less	523	6·2	5·98	9·9	1·96	2·36	20·2	5·86	4·97	0·89	15·2
9–10 ...	588	9·56	4·09	12·05	2·7	2·29	21·1	9·17	7·54	1·63	17·6
11–12 ...	629	11·47	4·8	12·5	2·6	1·9	21·9	10·9	8·95	1·95	17·9
13–14 ...	468	13·45	5·84	16·00	2·5	2·38	26·77	12·67	9·85	2·82	22·2
>14 ...	373	16·09	9·57	24·12	2·4	1·14	37·2	14·55	10·1	4·45	30·5

The results of the present survey have confirmed these observations. Table I shows that the total percentage loss remains fairly constant in litters up to and including 12 in number, but the death-rate shows a significant rise in litters of 13 and 14 and a very

Figures derived from data in the National Pig Records show that during the period October, 1954, to September, 1956, inclusive, losses in the 2 half-yearly periods October to March averaged 26.4 per cent. and from April to September 22.3 per cent. The

comparable figures for the present survey are 26.8 and 24.9 per cent.; losses being highest during October to December inclusive (27.2 per cent.) and lowest from July to September (24.6 per cent.). These figures are based on all losses, including piglets dead at birth.

Fertility of Sows

The number of pigs reared by a sow in one year is of more importance as an index of fertility and productivity than is the number of pigs reared in individual litters. A litter average of 8.1 pigs reared to 8 weeks of age may seem to indicate a satisfactory measure of production but a good sow should produce and rear 2 such litters within 1 year. There is no reason, other than a failure to breed, why sows should not do this. The normal interval between one mating and the next, assuming the piglets are weaned at 8 weeks of age, and the sow is served at the first heat period after weaning, is 172 days and if the sow is breeding normally she is therefore capable of breeding and rearing 2 litters in 344 days. It seems, however, that many sows do not breed with this regularity.

Gracey found in his Northern Ireland survey that the average number of litters per sow per year varied from 1.4 in Tyrone to 1.8 in Armagh. Records from 1,623 litters in Hertfordshire (1933-8) showed the average interval between litters to be 191 days (Reid, 1954) while the National Pig Records gave a figure of around 187 days.

The average farrowing index for those sows in the present survey which gave birth to two or more litters was 183 days, a figure which might suggest that breeding performance was satisfactory, in that the sows were, on average, producing and rearing two litters in a year. A closer look at the data shows, however, that breeding performance was by no means as satisfactory as might appear by taking the average interval as the index of fertility. Some 18.4 per cent. of the litters were early-weaned, with the result that many of the intervals between farrowings lay between 130 and 150 days; while in 21.5 per cent. of the total farrowings delayed conception resulted in intervals between farrowings exceeding 193 days. In 12 sows the interval between successive litters was more than 1 year. The distribution of the farrowing indices is shown below. The farrowing index in this table from 172 to 193 days covers the normal system in which piglets are weaned at 8 weeks and the sow is served at the first or second subsequent heat. It is evident from the figures that a significant proportion of the sows are either not served, or if served, failed to conceive at this time. There may therefore be an infertility problem in sows comparable to that in other species such as the cow.

DISTRIBUTION OF FARROWING INDICES—EXPRESSED AS PERCENTAGE OF TOTAL

Days ...	<172	172–193	193–250	250–300	300–350	>350
Percentage	18·4	60·0	18·2	1·6	0·8	0·9

Causes of Mortality

The incidence of losses at different ages in the pre-weaning period was reflected in the number of carcases, or batches of carcases, in the various age groups that were examined in the investigation centres. It can therefore be accepted that the carcases were a representative sample of the losses that occurred during the survey period.

Although the survey was primarily concerned with the incidence and causes of death within the first 8 weeks, arrangements were also made to examine older animals that died in the survey herds, other than those affected with scheduled diseases. Gracey found that post-weaning losses in Northern Ireland accounted for 1.3 per cent. of all piglets born while Longwill gave a figure for New Zealand of 3.6 per cent. Recording of losses in the present survey was confined to the pre-weaning period, although from the number of animals received for examination losses among older pigs are estimated at 1.8 per cent.

Age group	Still-born	Birth–7 days	1–3 weeks	3–8 weeks	2–4 m.	>4 m.
Percentage loss in group	6·04	15·35	2·5	1·97	1·8	
Number of carcases or batches examined ...	523	1,725	434	383	388	129

In analysing the causes of pre-weaning deaths, most workers (Menzies-Kitchin, 1938, Gracey, 1955) consider all losses from birth to weaning as a whole but as it is apparent that the causes of death differ at various stages of the suckling period, different age groups are here considered as separate entities. This method has the advantage of showing how the causes of death change with increasing age. This change is apparent even during the first week of life and for this reason, losses occurring from birth to 3 days, and from 3 to 7 days, have been analysed separately. The findings have also been aggregated into groups of conditions, referring either to the body system affected, or to a common origin. The results for all piglets born alive, including adults, are shown in Tables III, IV, and V. The findings in stillborn piglets are not shown in the tables.

Stillbirths

Laboratory examination sheds little light on the problem of stillbirths. It has been shown in Table I that the incidence of stillborn piglets increased in the numerically larger litters and this seems to be related to prolonged labour and death from anoxia or trauma during delivery. Some 26 of the batches showed evidence of one or other at *post-mortem* examination. Another 28 were oedematous or showed developmental abnormalities rendering them non-viable at birth and a single batch were deficient in vitamin A. In 18 cases intra-uterine death was attributed to bacterial infections, mainly *E. coli* and streptococci. But the contribution which these various causes made to the whole problem was relatively small and in 450 out of the 523 batches (86.0 per cent.) no explanation could be offered to account for the deaths. That the diet and management of the sow may play some part in causing these losses is

TABLE III
ANALYSIS OF CAUSES OF DEATH—BIRTH TO 7 DAYS

Group	Cause of death	<3 days			3–7 days		
		Number	Group total	Percentage of total loss	Number	Group total	Percentage of total loss
Physical and developmental	Overlain by sow	542	861	67·5	116	212	47·1
	Overlain and bacterial infection	15			5		
	Starvation	142			60		
	Starved and overlain	41			8		
	Starved and bacterial infection	12			4		
	Low viability at birth	33			1		
	Runts (died or killed)	38			8		
	Oedematous at birth	28			4		
	Exposure	10			6		
Genetical	Imperforate anus	32	61	4·8	13	19	4·2
	Strangulated hernias	5					
	Skeletal defects	16			3		
	Cleft palate	1					
	Uro-genital defects	7			3		
Respiratory system	Rhinitis		5	0·4	3	9	2·0
	Pneumonia	5			5		
	Pleurisy				1		
Alimentary system	Enteritis :—		53	4·2		46	10·2
	E. coli	21			22		
	Other bacteria	3			9		
	Non-bacterial	29			14		
	Gastritis				1		
Deficiencies	Anaemia	8	9	0·6	10	10	2·2
	Avitaminosis A	1					
Bacterial Infections	Generalised :—		66	5·2		56	12·4
	E. coli	36			20		
	Streptococci	19			18		
	Mixed Coli/Streptococci	2					
	Cl. welchii, type C	2					
	C. pyogenes	1					
	E. rhusiopathiae				3		
	H. influenza suis				2		
	Unidentified				2		
	Localised :—						
	Omphalo-phlebitis	6			7		
	Arthritis				2		
	Arthritis/Meningitis				2		
Miscellaneous Conditions	Digestive—impactions, etc.	4	22	1·7	12	22	4·9
	Ataxia	4					
	Congestion of lungs	1					
	Haemolytic disease	4			1		
	Hepatitis	2			1		
	Intoxication (Fe)				1		
	Intussusception	1					
	Nephritis				2		
	Peritonitis	4			3		
	Pyelo-nephritis				1		
	Ruptured stomach	1					
	Trembles	1					
	Leukaemia				1		
	No cause found	198	198	15·5	76	76	16·9
Totals		1,275			450		

suggested by the fact that the highest incidence in each of the survey years occurred in litters farrowed in March. Investigations by Pullar (1950) in Australia showed that an unbalanced and deficient diet was a common factor in herds in which sows had either aborted or given birth to a high percentage of stillborn piglets. A peak incidence in March suggests the possibility of a deficiency which only occurs when sows are kept indoors during the winter and fed entirely on compounded rations and which does not occur during other times of the year when the sows are at pasture.

Birth to 3 Days (Table III)

The main causes of death in this age group are listed under the group heading Physical and

Developmental. A small proportion of piglets are oedematous, or of low viability, or grossly undersized at birth and would probably die soon after birth in any case. But the majority of piglets in this age group die as the result of being overlain by the sow or because they are unable to get milk and so die of starvation, probably with a terminal hypoglycaemia. This period also accounts for most of the

TABLE IV
ANALYSIS OF CAUSES OF DEATH—1 TO 8 WEEKS

Group	Cause of death	1–3 weeks			3–8 weeks		
		Number	Group total	Percentage of total loss	Number	Group total	Percentage of total loss
Physical and Developmental	Overlain by sow	86	152	35·0	21	49	12·8
	Overlain and bacterial infection	2					
	Starvation	32			4		
	Starved and overlain	2			2		
	Runts (died or killed)	21			22		
	Oedematous at birth	3					
	Exposure	6					
Genetical	Imperforate anus	4	17	3·9	14	16	4·2
	Strangulated hernias	4					
	Skeletal defects	4			2		
	Cardiac defects	2					
	Uro-genital defects	1					
	Pyloric stenosis	2					
Respiratory system	Rhinitis	1	15	3·4	1	57	14·9
	Pneumonia	14			55		
	Pleurisy				1		
Alimentary system	Enteritis :—		60	13·8		45	11·8
	E. coli	16			9		
	Unidentified bacteria				2		
	Non-bacterial	44			12		
	Necrotic enteritis				10		
	Acute haemorrhagic enteritis				4		
	Gastro-enteritis				8		
Deficiencies	Anaemia	37	39	9·0	37	37	9·7
	Rickets	2					
Bacterial infections	Generalised :—		63	14·5		99	25·8
	E. coli	18			19		
	Streptococci	18			7		
	Pasteurella				8		
	E. rhusiopathiae	6			1		
	Salm. cholera-suis				2		
	H. influenza suis				3		
	Unidentified	1					
	Localised :—						
	Arthritis	10			8		
	Arthritis-meningitis	1					
	Post-injection/operative	6			2		
	Omphalo-phlebitis	1			1		
	Endocarditis	1			2		
	Encephalitis	1					
	Meningitis				4		
	Pyaemia				8		
	OEDEMA DISEASE				34		
Miscellaneous Conditions	Peritonitis	5	31	7·1	11	43	11·2
	Pericarditis	4			5		
	Nephritis	3			1		
	Hepatitis	4			3		
	Volvulus				3		
	Drowned	2					
	Swine fever				3		
	Exudative dermatitis				2		
	Cirrhosis of liver				2		
	Digestive—impactions, etc.	10			6		
	Other miscellaneous conditions	3			7		
	No cause found	57	57	13·1	37	37	9·7
Totals		434			383		

losses from such genetical defects as atresia ani (imperforate anus), deaths from such conditions as strangulated hernias usually occurring later in life.

Infections are not unimportant even at this early stage in the pig's life, in some cases being generalised and in others confined to the intestines. The important organisms causing generalised infections at this time are *E. coli* and streptococci, and *E. coli* seems also to be responsible for about 40 per cent. of the cases of enteritis. It is clear that *E. coli* infection

TABLE V
ANALYSIS OF CAUSES OF DEATH— >2 MONTHS

Group	Cause of death	2–4 months			>4 months		
		Number	Group total	Percentage of total loss	Number	Group total	Percentage of total loss
Physical and Developmental	Injury	8			5		
	Starved	3	44	11·3		5	3·9
	Runts	33					
Genetical	Strangulated hernias	19			5		
	Skeletal defects	2	21	5·4	1	6	4·6
Respiratory system	Rhinitis	2					
	Pneumonia	77	79	20·4	33	33	25·6
Alimentary system	Enteritis :—						
	E. coli	14			3		
	Unidentified bacteria	1					
	Non-bacterial	27	80	20·6	4	16	12·4
	Necrotic enteritis	24			6		
	Acute haemorrhagic enteritis	5			3		
	Gastro-enteritis	9					
Deficiencies	Anaemia	10	10	2·6			
Bacterial infections	Generalised :—						
	S. cholera-suis	25			9		
	Streptococci	5			1		
	Pasteurella	4			3		
	E. coli	3			1		
	E. rhusiopathiae				1		
	C. pyogenes				2		
	Cl. welchii, type C	1					
	Unidentified	1			1		
	Localised :—		96	24·7		48	37·2
	Endocarditis	8			4		
	Arthritis	3			6		
	Pyaemia	1					
	Meningitis				1		
	Post-parturient fever				1		
	Endometritis				5		
	Pyelonephritis				5		
	Cystitis				1		
	Post-operative infection	1					
	OEDEMA DISEASE	44			7		
Miscellaneous Conditions	Peritonitis	8			2		
	Volvulus	6			4		
	Hepatitis	7					
	Ruptured bowel	4			2		
	Pericarditis	2			2		
	Swine fever	4					
	Serositis	3					
	Neoplasia				3		
	Mulberry heart disease	2	50	12·9		17	13·2
	Prolapsed rectum	2					
	Intussusception	2					
	Ascites	1			1		
	Congestion of lungs	2					
	Ileitis	1			1		
	Roundworms	2					
	Impaction	3					
	Other miscellaneous conditions	1			2		
	No cause found	8	8	2·0	4	4	3·1
Totals		388			129		

in piglets resembles the same kind of infection in calves, in that the organism may cause localised or generalised infection, there frequently being examples of each within a litter.

Rather more than half the cases or outbreaks of enteritis were non-bacterial in origin. This is clearly a field for further investigation which becomes even more important as the incidence of enteritis increases in the older age groups.

Three to 7 Days (Table III)

The main changes in this age group are a fall of about 20 per cent. in the incidence of deaths from physical causes and increases in bacterial infections and cases or outbreaks of enteritis. *E. coli* and streptococci remain as the main causes of generalised infections, and *E. coli* is again responsible for about half the cases of enteritis. Recent studies by Saunders, Stevens, Spence and Sojka (1960) show that *E. coli* infection in piglets up to a week old is almost invariably due to one or other of 2 *E. coli* serotypes, OKE 68 and OKG 7. The source of streptococcal infection in piglets requires investigation but it seems probable that infection is contracted from the sow. The results presented in Table III show that some 80 per cent. of all deaths during the first week of life were attributable to 4 groups of conditions, of which that designated Physical and Developmental was by far the most important.

One to 3 Weeks (Table IV)

This period showed a further fall in the incidence of deaths from physical and developmental causes by about 12 per cent. The incidence of losses in this group would be rather less in this, and in later age groups were it not for the fact that pigs designated as runts are still included in it. Such pigs should perhaps at this stage more properly be described as debilitated and included in the group of miscellaneous conditions. The decrease in losses within this group is replaced by the appearance of deficiency diseases, mainly anaemia, as a cause of death.

Generalised and localised bacterial infections show a slight increase, particularly the latter, with arthritis as the most common form of localised infection. *E. coli* and streptococci remain as the main causes of bacterial infection but are now joined by *E. rhusiopathiae*. The incidence of enteritis also shows a further increase with a higher incidence of non-bacterial enteritis and a corresponding fall in *E. coli* infection. By this time losses in pigs with atresia ani have ceased but deaths continue to occur in pigs with a variety of other developmental abnormalities.

Three to 8 Weeks (Table IV)

The changing pattern of the causes of death in pigs with increasing age continued in this group. Physical and developmental causes are now considerably less important than other causes, such as bacterial infections. But the species of bacteria which may cause death in pigs has now increased to include such organisms as *S. cholera-suis* and *Past. suiseptica*. More important still, the group of bacterial infections contains a relatively high incidence of deaths from oedema disease, which can now almost certainly be accepted as resulting from *E. coli* infection. The occurrence of oedema disease during this period of the pig's life is linked with an increasing tendency to practise early weaning.

Anaemia showed a similar incidence to that found in the preceding period but pneumonia showed a dramatic rise in its incidence as a killing disease. Hernias which had become strangulated were almost alone in the group of conditions of genetical origin.

A feature of enteritis in this age group is that the types are more varied than in younger pigs, with the necrotic and acute haemorrhagic forms making their appearance for the first time.

The balance in this group has, therefore, changed, with bacterial infections, anaemia, and diseases of the respiratory and alimentary systems being collectively responsible for over 70 per cent. of the total losses.

Two to 4 Months (Table V)

In this age group, bacterial infections continued to account for about one quarter of the deaths but the majority of these were due to acute paratyphoid (*S. cholera-suis* infection) and to oedema disease. *E. coli* and streptococci were no longer of importance as causes of generalised infection.

Both pneumonia and enteritis showed an increased incidence and among the latter, outbreaks of necrotic enteritis reached a peak incidence. Only a few cases of anaemia occurred in this age group but there was a wider range of miscellaneous conditions which individually were of little importance but collectively made a significant contribution to the total deaths.

Pigs over 4 Months of Age (Table V)

The number of pigs over 4 months of age was relatively small and because of this, it may be that the findings are not representative of losses in mature animals in the pig population as a whole. Nevertheless, the findings are consistent with those reported in the previous age group. Bacterial infections, pneumonia, enteritis, and a variety of miscellaneous conditions collectively accounted for about 80 per cent. of the deaths. Cases continued to occur of oedema disease, and paratyphoid, and as might be expected, certain conditions peculiar to the breeding sow made a significant contribution to the total loss, in particular such conditions as endometritis and pyelonephritis.

Summary of Causes of Death from Birth to Maturity

A summary of the facts and figures relating to deaths during all stages of the pig's life is given in Table VI. In this table the losses occurring at different ages are related solely to a body system or to a common origin, with the exception of those listed under the headings " Miscellaneous " and " No cause found." The table shows clearly the contribution which each group of conditions makes to the total problem.

The incidence of deaths from physical and developmental causes (group 1), shows a progressive decline from birth to maturity. The conditions within this group are responsible for most of the deaths occurring during the first week of life.

TABLE VI
SUMMARY OF CAUSES OF DEATH IN PIGS

Number of group	Nature of group of conditions	Percentage of total deaths in age group					
		<3 days	3–7 days	1–3 weeks	3–8 weeks	2–4 months	>4 months
1	Physical and developmental ...	67·5	47·1	35·0	12·8	11·3	3·9
2	Genetical	4·8	4·2	3·9	4·2	5·4	4·6
3	Respiratory system	0·4	2·0	3·4	14·9	20·4	25·6
4	Alimentary system	4·2	10·2	13·8	11·8	20·6	12·4
5	Deficiencies	0·6	2·2	9·0	9·7	2·6	—
6	Bacterial infections—including OEDEMA DISEASE	5·2	12·4	14·5	25·8	24·7	37·2
7	Miscellaneous conditions ...	1·7	4·9	7·1	11·2	12·9	13·2
8	No cause found	15·5	16·9	13·1	9·7	2·0	3·1

Deaths from conditions of genetical origin (group 2) remain at a fairly constant level throughout the pig's life, most of the deaths during the first week of life being in pigs with atresia ani and in older pigs among those with strangulated scrotal or umbilical hernia.

Conditions affecting the respiratory tract (group 3) cause but few deaths until pigs are 3 weeks old, but subsequently show a sharp rise and progressively increasing incidence to maturity.

The complex of conditions affecting the alimentary tract (group 4) is of importance throughout the life of the pig but the nature differs in the various age groups. In early life enteritis is often akin to white scour in calves and the indications are that it has a related aetiology. But many outbreaks are non-bacterial in origin and there is evidence to show that some of these are due to virus infection (Goodwin & Jennings, 1958). Necrotic enteritis starts to assume importance towards the end of the weaning period and shows a peak incidence when pigs are between 2 and 4 months of age. It is generally assumed that this form of enteritis is due to infection with *S. cholera-suis*, in other words, that it is the chronic form of paratyphoid, and there is some support for this in the fact that the acute form shows its highest incidence in this same age group. Nevertheless, the isolation of this organism from cases of necrotic enteritis is the exception rather than the rule. The acute haemorrhagic form of enteritis occurs in the same age groups of pigs and is another condition of uncertain aetiology.

A few cases of anaemia (group 5) occur towards the end of the first week of life but outbreaks mainly occur during the subsequent weeks before weaning. This condition continues to make a significant contribution towards the total mortality during the suckling period, although it should be noted that many fatal cases are concurrently affected with enteritis.

Bacterial infections (group 6) constitute a problem which becomes progressively more important as the pig grows. Up to the end of the first week of life the organisms concerned are mainly *E. coli* and streptococci and these continue to cause generalised and localised infections up to weaning. But after the first week of life other bacteria join them in causing clinical infections, notably *E. rhusiopathiae*, *Past. suiseptica*, and *S. cholera-suis*. The latter is particularly important during the 2- to 4-month period. The occurrence of oedema disease is responsible for much of the increase during the late suckling and early store period.

The contribution which miscellaneous conditions (group 7) make to the total mortality shows a progressive increase from birth to maturity. In the main, the conditions included in this list, such as volvulus, ruptured bowel, and peritonitis, are of a kind which have to be accepted as normal hazards and about which little can be done.

There remains a not unimportant group of pigs (group 8) in which *post-mortem* and laboratory examinations fail to provide any explanation to account for death. There is a decreasing incidence of such cases in the older age groups and it seems probable that the relatively high incidence in young pigs is due to deaths from physiological causes, the nature of which can only be determined by biochemical or other methods which do not fall within the range of technical procedures normally carried out in investigation centres.

Discussion

Before the introduction of early weaning it was accepted by the generality of pig farmers that production was satisfactory if a sow gave birth to 2 litters and reared 16 of the piglets within a year. But in 20 per cent. of the litters covered by this survey less than 5 piglets were reared per litter and the desired level of production would not have been achieved were it not for the fact that some 18 per cent. of the total litters were early weaned. The variation in the intervals between litters discloses a measure of, at least, temporary infertility which warrants closer study.

It might be expected in a species with an average of 11 young at birth that occasional piglets are born dead but a situation cannot be accepted as normal in which the whole or major part of a litter is dead at birth, still less so if a succession of litters is so affected. There is a clear need for investigation in order to determine whether such losses are due to infection or to some other cause, such as the nutrition of the sow during pregnancy.

Nearly 26 per cent. of all the piglets born failed to survive to 8 weeks of age, over 80 per cent. of the deaths occurring before the end of the first week. Losses were highest in litters over 12 in number, suggesting that there is a limit above which there is little to be gained by selecting sows for breeding

on the basis of prolificacy. It would seem that fecundity is only one of several criteria which should be applied before selecting potential breeding stock. It is a common experience that mortality among young pigs during the first few days removes more of the small ones than the large, the lighter pigs being less active and robust and more liable to be killed by the sow. Cray (1955) says: "The sows we want are those that drop 10 to 12 piglets and rear practically the whole of them. It follows that breeding stock should be selected from sows with this sort of performance." He continues, "An over-large number of piglets born may be just as objectionable as too few. Very large numbers born usually means low individual birth weights, including a number of very small piglets." This suggests that if the average weight at birth could be raised, losses at and shortly after birth would be lessened. The ability to produce litters of even size seems to be governed as much by the genetical make-up of the sow as by feeding and management during pregnancy. The boar to which the sow is mated seems to play no part in this, as is shown by an observation reported by the Institute of Animal Genetics, Edinburgh, in the Pig Breeders' Annual (1940). The first 3 litters of one sow by 3 different boars numbered 10, 11, and 10 and averaged 3.3, 3.5 and 3.6 lb. at birth. A second sow managed and mated in a similar way gave birth to 3 litters numbering 11, 10 and 9 and averaging 1.9, 1.8 and 1.8 lb. at birth. The chances of survival of piglets from the first sow are much brighter than are those of the second. But selection of sows for their ability to produce even litters of well-developed pigs is only one approach to the problem of preventing early deaths, the other important aspect being that of management. The conditions in which many sows farrow are conducive to losses in piglets, in that they lack warmth and freedom from draughts. Modifications to existing buildings would often help in reducing losses.

While genetical defects do not, in themselves, constitute an important cause of mortality, a tendency to transmit undesirable defects should be sufficient to cause the rejection of a boar or sow, or of their progeny, for breeding, admirable though the offspring may be in other respects.

It is clear that infections with *E. coli* and streptococci are important causes of death in early life. Before any attempt can be made to control streptococcal infections, investigations are needed to determine whether the organisms are acquired from the dam or from some other source. The fact that two *E. coli* serotypes are mainly responsible for clinical disease in piglets suggests that losses may be preventable by vaccination of the dams or by giving serum to the piglets. Vaccination has already been tried with promising results (Gordon & Luke, 1958).

Further work is clearly needed on the cause, or causes, of non-bacterial enteritis. It is evident that some outbreaks are due to virus infection (Goodwin & Jennings, 1958), but the finding that pigs may harbour a variety of enteroviruses suggests that more than one may be concerned (Beran, Werder & Wenner, 1958; Lamont & Betts, 1958).

The important rôle played by *S. cholera-suis* in pigs over 2 months of age suggests that further research is needed to find an effective method of control. The part played by this organism in producing necrotic enteritis should also be re-examined.

Infections of the respiratory tract make an important contribution to the total mortality, particularly in pigs more than 2 months of age, but much work remains to be done to determine the relative importance of different kinds of pneumonia, for although the problem has received a great deal of attention during the last few years the position is still rather confused.

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B.V.A. HANDBOOK ON PARASITIC DISEASES OF CATTLE

It has been brought to our notice that the dose of sulphadimidine, given as a treatment for coccidiosis, has been misquoted in this B.V.A. handbook.

On page 42 under "Treatment," the recommended dose should read: "on the first occasion 100 to 200 mg. per kg. bodyweight (5 to 10 gm. per cwt.) followed by half this dose given daily for 3 to 5 days."

THE CENTRAL VETERINARY SOCIETY

We are asked to state that the paper by E. G. C. Clarke and J. Hickman, published in our issue of October 17th, was originally read at the joint session of the Central Veterinary Society and the South-eastern Metropolitan Orthopaedic Club, on April 2nd, this year.

ERRATUM

On page 763 of last week's RECORD it was stated that Messrs. Edwards and Stephen were admitted to the Register in virtue of the registrable degree of B.V.SC., of the University of Liverpool. We regret that this was incorrect; these gentlemen were admitted to the Commonwealth section of the Register in virtue of their Commonwealth qualifications.

Hydramnios in the Ewe

BY
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THERE are several references in veterinary literature to hydramnios in cattle, in which it occurs not infrequently. However, it has never been reported in sheep, and for this reason the following case is recorded.

Case History

Subject. A pure-bred 2-year-old Kerry ewe.

History. The animal, described by the farmer as having outstanding merit, lambed normally in the first year as a hogg. For the 2 to 3 weeks prior to being brought to the surgery, she was noticed by the owner to be getting abnormally large. He thought the ewe might be carrying 3 to 4 lambs or that she might be ruptured. The animal had been eating well but during the previous few days had not come to the trough to feed, and during the last 4 or 5 days the farmer thought, due to the changes in the vulva and udder, that she was going to lamb. Lambing in the flock was not due to start for another 2 weeks.

Clinical examination. The ewe was brought to the surgery on March 3rd, 1959. The abdomen was greatly enlarged and although the animal was quite unable to rise she was bright and alert. She was in poor bodily condition. Her temperature was normal, there was a thick plug of mucus in the cervix, and there was no milk in the teats.

A diagnosis of hydramnios was made.

Treatment. It was decided to try a two-stage operation as described by Neal (1956) for the cow. A prophylactic dose of 1,000,000 units of crystalline penicillin and 1 g. of streptomycin was given, as well as 250 mg. chlorpromazine hydrochloride intramuscularly. The upper part of the left sub-lumbar fossa was infiltrated with 5 per cent. procaine hydrochloride. The animal was cast on her right side and secured. The operation site was cleansed and sterile drapes placed round it.

On entering the peritoneal cavity the uterus was found to be greatly enlarged and the lambs were not palpable. A 3-inch piece of ¼-inch glass tubing, with just over 3 feet of rubber tubing attached, was thrust into the uterus so that about 2 feet of the rubber tube remained outside. The tube was sutured in place to the uterus and the abdominal wound temporarily closed around it.

The ewe was given subcutaneously 16 fl. oz. of 10 per cent. glucose saline and 8 oz. of a proprietary mixture of 25 per cent. calcium borogluconate, phosphorus, and magnesium.

During the first half an hour 2 gallons of clear fluid was collected, after which the rate of flow was eased by applying artery forceps to the rubber tubing. Fluid continued to drain away from the tube for another 3 hours but was not collected. It is estimated that at least a total of 4 gallons of fluid was present in the uterus.

After the removal of the fluid the poor nutritional state of the animal was most marked. On the following day the ewe was dull and still unable to stand. The abdominal wall was slack. The temperature was normal but the mucous membranes were congested.

Caesarean section was carried out the following day, some 20 hours after the initial drainage operation. A further 100 mg. of chlorpromazine hydrochloride were given and the operation site was anaesthetised again with lignocaine hydrochloride. The original wound was now extended ventrally and the drainage tube, which was still in position, was removed. By carefully incising the uterus and foetal membranes, the condition was in fact found to be hydramnios and not hydrallantois, as are some of the cases in cattle. There was no oedema of the foetal membranes. Three dead, but not putrefying, lambs were removed. One lamb was found in the left uterine cornua and the other 2 were in the right cornua. They appeared macroscopically normal and fully developed. The 2 males weighed 5 and 5½ lb. respectively, and the female, 3½ lb. At the end of the operation the ewe was given 16 fl. oz. of 10 per cent. glucose saline subcutaneously.

The animal remained dull throughout the day and during the evening was given a raw egg in half a pint of milk. She died during the night.

Post-mortem *examination.* The uterus had contracted considerably and was normal in appearance. There was some slight bruising of the left broad ligament, and the right broad ligament together with its attachment to the right subiliac region showed extensive bruising; also, the peritoneum appeared to have separated from the underlying muscle in this area. There were one or two small petechial haemorrhages on the peritoneum around the operation wound but the rest of the peritoneum was normal.

The alimentary canal was normal except for the rumen which was about one third its normal size. The liver and kidneys showed fatty changes being rather pale in colour and soft. The kidneys also showed some patches of congestion. The lungs appeared normal except for some patchy congestion. The heart was enlarged to about one and a half times normal size, there being hypertrophy of the left ventricle.

Post-mortem examination of the lambs revealed nothing macroscopically abnormal except that the bladder of the largest lamb was full of fluid.

Discussion

In view of the fact that the rumen was small in size and that the animal had not been feeding properly for the last 2 or 3 days, it is possible the ewe was suffering from some degree of pregnancy toxaemia and this may have influenced the success of the operation.

Although only this one case has been seen, from conversations with farmers who describe having seen ewes with similar symptoms, it is thought that the condition is more common than is generally recognised.

Acknowledgments.—The authors' thanks are due to Mr. D. MacLeod, M.R.C.V.S., for help and advice. We also wish to thank the assistant librarian of the Royal College for her careful search through the literature.

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Urine Analysis in the Dog

BY

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SUMMARY.—An account is given of the routine method employed by the author. This method is suitable for use in practice.

Introduction

ALL veterinary clinicians agree that the qualitative examination of the urine of the dog can be a useful aid to diagnosis and prognosis. The usual tests which are applied to urine specimens are detailed by Boddie (1956), Coffin (1953), and the Technical Development Committee of the British Veterinary Association (1952). These authorities employ relatively large volumes of urine and reagents. To go to the other extreme Harvey (1957), and Wilkinson and Harvey (1958) have modified these methods for the examination of very small volumes of urine. Various proprietary tablet tests and paper strip tests are available which have several advantages (Hoe & Wilkinson, 1958; ReesEvans & Campbell, 1958; Stratton, 1957, 1959; Stratton & Wilkinson, 1958, 1959). A search of the literature produces a further crop of tests and techniques. The clinician about to equip a small laboratory, or the veterinary student seeking useful information, is thus faced with a bewildering number of possible methods of qualitative urine analysis.

An account of the method actually used by the author for rapid routine urine analysis in the dog was thought to be of general interest.

Apparatus and Reagents

Apparatus

Urinometer (hydrometer) range 1,000 to 1,060 with suitable trial jar (cylinder).
Glass Funnel.
Filter Paper, Whatman No. 1 (9 cm.).
Test-tubes, 75 × 10 mm. (3″ × ½″) with rack.
Clinitest test-tubes and rack.
Clinitest droppers (pipettes).

Reagents

B.D.H. Narrow Range Indicator Paper *p*H 5.5-7.0.
" " " " " *p*H 7.0-8.5.
Clinistix Reagent Strips
Clinitest Reagent Tablets
Acetest Reagent Tablets
Occultest Reagent Tablets
Ictotest Reagent Tablets
} Ames Company

20 per cent. Sulphosalicylic Acid (Salicyl-sulphonic acid) in dropper bottle.
Sublimed Sulphur in wide-necked jar.

The Specimen

The urine specimen should be fresh and should preferably be examined at once. If the urine specimen has to be kept overnight it should be stored in a refrigerator at about 4° C.; in this case allow the specimen to attain room temperature before starting the examination. Urine specimens must be in clean containers; errors have arisen due to the use of dirty bottles and contaminated stoppers.

Technique*

1. The colour, transparency, and odour of the urine specimen are noted, as is the presence of any sediment.
2. The specific gravity is determined using the urinometer. The urine of normal dogs has a specific gravity of 1,015-1,045, the average falls between 1,020 and 1,030.
3. The reaction of the urine is determined by using the indicator papers. Normal dog urine has a *p*H between 6.0 and 7.0.
4. (a) The Clinistix Reagent strip is used to detect glucose.
(b) If the urine contains glucose the amount is estimated using Clinitest Reagent Tablets.
5. Acetest Reagent Tablets are used to detect acetone and diacetic acid.
6. Proteinuria is detected by adding 3 drops of 20 per cent. sulphosalicylic acid to 1 cm. (approximately 1 ml.) of urine in a 75 × 10 mm. test-tube. If the urine is not clear it should be filtered before carrying out this test. The presence of protein is shown by the formation of a white precipitate. Alkaline urines may give a false negative, often with effervescence, in these cases an excess of sulphosalicylic acid should be added.
7. Ictotest Reagent Tablets are used to detect bilirubin.
8. Hay's test is used to detect bile salts. A small amount of sublimed sulphur (flowers of sulphur) is sprinkled on the surface of the urine. If bile salts are present the sulphur immediately begins to sink.
9. Occultest Reagent Tablets are used to detect blood.

Discussion

This technique can be carried out upon a small volume of urine, about 5 ml. is adequate, except for the determination of specific gravity.

A 24-hour specimen from the dog is almost impossible to obtain. The value of the examination of one urine specimen is thus limited, but the examination of several specimens during the course of the disease is most useful (Wooldridge, 1936; Worden, 1939; Uvarov, 1944).

The author uses a human urinometer which

* All the proprietary tests are used according to the manufacturer's instructions.

requires about 50 ml. of urine if satisfactory results are to be obtained, although by using a suitable cylinder the volume may be reduced to 40 to 35 ml. Miniature urinometers are available which will give results with volumes of urine as small as 15 ml. If a urinometer is used in a relatively narrow cylinder the accuracy is reduced by the effects of surface tension. It must be remembered that hydrometers are standardised at a given temperature, allowance should be made for this. Freshly voided specimens will read low, and refrigerated specimens high. The correction is +0.001 for every 3° C. above the standardisation temperature, and −0.001 for every 3° C. below that temperature.

Several techniques have been described for the determination of the specific gravity of a drop of urine if the volume is too small to float a urinometer (Coffin, 1953; Harvey, 1957; Armstrong & Hawkins, 1958). The author believes that these methods are too delicate for general use and in routine work omits the determination of the specific gravity in these cases.

The use of narrow-range indicator papers is not essential; red and blue litmus paper is quite satisfactory for the determination of the reaction of dog urine.

Tes-Tape Urine Sugar Test Tape* may be used instead of Clinistix Reagent Strips.†

Clinitest Reagent Tablets are designed as a qualitative test, but if the test is carried out according to the manufacturer's instructions it may be regarded as quantitative in the range 0 to 2 per cent. which is adequate for clinical purposes.

The author prefers to use the sulphosalicylic acid test for proteinuria as it is simpler than the proprietary tablet test, and it requires a smaller volume of urine. The paper strip test for proteinuria may be used as a simple screening test, but it does not replace the sulphosalicylic acid test in routine urine analysis (Stratton & Wilkinson, 1959).

Lewis (1956) has recently revived the methylene blue test for bile pigments in urine; the author has not found this method to be satisfactory and prefers the proprietary tablet test.

The author does not examine dog urine for the presence of indican as a routine. The possibility of intestinal stasis can usually be excluded at the clinical examination.

The great advantage of the proprietary tests is that they are simple to use and do provide a standardised technique, if the manufacturer's instructions are followed.

Microscopic examination of urine deposit can supply most useful information.

Boddie (1956) and Coffin (1953) deal with the interpretation of the results of urine examination in some detail.

* Eli Lilly & Company Ltd.
† Ames Company.

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Current Literature

ABSTRACTS

B.C.G. and Vole Bacillus in the Prevention of Tuberculosis in Adolescents. (2nd Report.) MEDICAL RESEARCH COUNCIL, TUBERCULOSIS VACCINES CLINICAL TRIALS COMMITTEE. (1959). *Brit. med. J.* Sept. 12th, 1959. 379–396.

A controlled trial of B.C.G. and vole bacillus vaccines in the prevention of tuberculosis in England started in 1950 and is still continuing.

The first report to the Medical Research Council was presented by the Committee in 1956. This gave complete results after each participant had been in the trial for 2½ years. The present report gives corresponding results for the period of 5 years since entry to the trial, together with preliminary incomplete information for the period between 5 and 7½ years after entry.

The participants in the trial volunteered with their parents' consent between September 1950 and December 1952. They were all aged between 14 and 15½ years and most (82 per cent.) were between 14½ and 15 years. All were in their final year at secondary modern schools in densely populated districts in or near North London, Birmingham and Manchester. The B.C.G. vaccine used was the fresh liquid preparation from the State Serum Institute, Copenhagen and was given by intracutaneous injection. The vole bacillus vaccine was a fresh liquid preparation from the Lister Institute, Elstree, Herts, and was given by multiple puncture.

The great majority of the participants have continued to live in their original urban areas, apart from the 2-year period of military service which has involved about two-thirds of the young men.

As a result of an initial examination at school by M.R.C. teams the participants were automatically classified into 5 trial groups.

Tuberculin negative and left unvaccinated	(13,300)
Tuberculin negative and B.C.G. vaccinated	(14,100)
Tuberculin negative and vole bacillus vaccinated	(6,700)
Tuberculin positive to 3 Tuberculin units	(16,000)
Tuberculin positive to 100 Tuberculin units but not to 3 Tuberculin units	(6,600)

The participants of all 5 trial groups have been followed intensively by means of routine periodic radiographic examinations and tuberculin tests, individual contact also being maintained by postal enquiries and visits to the home. All definite and suspected cases of tuberculosis and all cases of pulmonary radiographic abnormality persisting for more than 14 days were submitted to an independent assessor for a final diagnosis.

A total of 349 definite cases of tuberculosis started within 5 years of entry to the trial.

During the 5-year period the annual incidence of tuberculosis in the B.C.G.-vaccinated group was 0·38 per 1,000 compared with 2·29 per 1,000 among those in the tuberculin-negative unvaccinated group who were admitted concurrently. This represents a reduction attributable to vaccination of 83 per cent. Over the same period the annual incidence of tuberculosis in the vole-bacillus-vaccinated group was 0·33 per 1,000 compared with 2·62 per 1,000 among those admitted concurrently to the tuberculin-negative unvaccinated group. This represents a protection of 87 per cent. The difference in incidence between the 2 vaccinated groups, when based also on concurrent admissions, could well have arisen by chance. The protective efficacy of each vaccine was thus substantial and was closely similar to that found for the first 2½ years of the trial (First Report of Committee to Medical Research Council 1956). Further, the incomplete information beyond 5 years shows that similar high levels of protection have continued up to at least 6½ years after entry.

The degree of protection was similar for pulmonary tuberculosis for tuberculous pleural effusions, and for hilar gland enlargement (in association with other lesions). On the other hand, since 4 cases of tuberculous meningitis and 4 of miliary tuberculosis were found among the negative unvaccinated participants, but none among those who were vaccinated, the degree of protection may have been greater for these forms. There is now a suggestion also that the lesions in the vaccinated cases were less extensive (both on the first abnormal radiograph and at their maximal extent) and less severe (as judged by the action taken by the clinician) than those in the negative unvaccinated cases. In other words, the degree of protection for the more extensive and severe lesions was certainly as great as, and may even have been greater than, that for the less extensive and severe lesions.

The strength of the early batches of vole-bacillus vaccine was below the standard intended, though these early batches conferred substantial protection against tuberculosis. *Lupus vulgaris* at the site of vaccination did not occur with these batches. Lesions indistinguishable from *L. vulgaris* developed among the 4,200 participants given the vole-bacillus vaccine after it had been brought up to standard strength. Of these 23 were severe enough to require treatment, 17 of these were known to have healed, 3 were known to have made a satisfactory early response to treatment but had not been seen recently, 3 failed to attend for treatment or subsequent observation. No similar lesions were found in the B.C.G.-vaccinated group.

There were 3 cases of erythema nodosum in the B.C.G.-vaccinated group and 4 cases of tuberculous adenitis in the vole-bacillus-vaccinated group (all of whom were given the vaccine after it had been brought up to strength).

Control of Anthrax. Suggestions Based on Survey of Imported Hides. SEMPLE, A. B., & HOBDAY, T. L. (1959). *Lancet*, Oct. 3rd., 1959, 507–8.

In 1958 more than 122,000 cwt. of dry hides were imported through the port of Liverpool ; over the previous 10 years the yearly average was 289,000 cwt. The chief sources from which these hides came were Argentina, East Africa and West Africa—all countries in which anthrax is enzootic. It was decided in 1958 to sample dry hides systematically immediately after discharge from ships. In all 1,053 samples were taken : 64 from Argentine cattle, 532 from East African cattle, 144 from West African cattle, 250 from West African goats, and 63 from West African sheep. Anthrax bacilli were recovered from 236 of these samples (22·4 per cent.). The degree of contamination in the various groups was : West African sheep 47·6 per cent., West African goats 35·6 per cent, West African cattle 34 per cent., East African cattle 12·4 per cent and Argentine cattle 3·1 per cent.

In spite of this evidence of a high proportion of imported hides being contaminated with anthrax, the incidence of the disease amongst those handling the hides was very low. In the 4-year period 1954–8 there were only 7 reported human cases of anthrax in Liverpool. Three were in dock-workers handling dry hides ; 2 in manual workers in a Government wool-disinfecting station ; 1 in a joiner who worked in a dock shed ; and 1 in a general labourer who worked in a fertiliser factory. Only the last case was fatal.

To explain the anomaly of the low incidence in those handling the material thus shown to be heavily contaminated, it is suggested that the natural human resistance to anthrax must be greater than is generally supposed. If the occasional case of anthrax in the human is due to a failure of resistance in a particular individual or to unusual virulence in the attacking bacilli, the best policy might be to raise the resistance of the workers by immunising procedures. Such a policy might give better results than enforcing more physical precautions—especially as the labour force concerned is notoriously unwilling to accept special physical restraints.

Griseofulvin Treatment of Acute Cattle Ringworm Infections in Man. COCHRANE, T., & TULLETT, A. (1959). *Brit. med. J.* Aug. 29th, 1959. 286–7.

During the first 3 months of 1959 the antibiotic griseofulvin was used in the treatment of fungus infections in the skin clinics in Ayrshire. As Ayrshire is an agricultural area the incidence of cattle ringworm infections of the skin is high.

The results of the treatment of 16 cases of acute inflammatory cattle ringworm with griseofulvin are described. All of the 16 cases had been in contact with cattle or farm buildings and in every case culture from hairs or epidermal scrapings produced *Trichophyton verrucosum*. The first cases received a daily

dose of 2 g. of griseofulvin for 1 week and the dose was then reduced as the clinical appearance of the lesion responded to treatment. Subsequent cases started and continued with 1 g. daily—with little or no difference on the duration of clinical involution of the active lesions as compared with those starting with 2 g. daily.

Two patients complained of mild gastro-intestinal upset while taking 2 g. of the antibiotic daily, but this disappeared when the dose was reduced to 1 g. daily. Clinical cure was achieved in periods varying from 12 days to 3 weeks. Four other cases of cattle ringworm infection were kept as controls on routine standard treatment. From 6 to 9 weeks elapsed in these cases before clinical recovery took place. The most noticeable difference between the cases treated routinely and those treated with griseofulvin, apart from the duration of clinical involution, was the rapid disappearance of general malaise, pain, and discomfort in the cases treated with the antibiotic.

In addition to the cases of acute cattle ringworm, 9 cases of other types of ringworm infections were treated with griseofulvin. The results appear to indicate that griseofulvin is an antibiotic of great value in the treatment of a large variety of fungus infections of the skin.

G. F. B.

Egg Transmission of Infectious Sinusitis in Naturally Infected Turkeys. JERSTAD, A. C., HAMILTON, C. M., & SMITH, V. E. (1959). *Avian Diseases.* **3.** 28-40.

Poults obtained from 4 flocks believed to be free from sinusitis were reared in isolation. The poults remained clinically free of the disease and the breeding flock reared from them showed no evidence of sinusitis during the 5 generations covered by the experiment. In contrast to this, poults from 5 infected flocks developed sinusitis during the brooding period, and the disease was transmitted to the second and third generations of the breeding flock reared from them.

The authors conclude that it appears indisputable that egg transmission of sinusitis does occur, but that it does not occur in all the progeny of infected breeders nor in all the hatches taken from them.

E. A. G.

Parakeratosis of Pigs (*translated title*). BEHRENS, H. (1957). *Dtsch. tierärztl Wschr.* **64.** 560.

The occurrence of parakeratosis cannot be prevented by free range, or the supply of antibiotics or vitamins. It only occurs where dry or damp feeding is practised. Left untreated, self cure is complete after about 3 months. The zinc content of erythrocytes, spleen, small intestine, and pancreas of affected animals is normal, that of the blood plasma, liver, and kidneys is markedly lowered, but is not related to the severity of the disease. The aetiology is not definitely known but is related to the calcium: phosphorus: zinc ratio and content of the food. Therapy is a standard dose of 0.5 g. zinc sulphate or carbonate per animal per day for 3 weeks, given in the food. For prevention, the addition of 50 to 100 g. zinc as sulphate or carbonate per ton of feeding-stuff is recommended. There is no danger of zinc poisoning.

Fractures of the Third Phalanx in Grazing Cattle (*translated title*). NUMANS, S. R., & WINTZER, H. J. (1958). *Dtsch. tierärztl Wschr.* **65.** 201.

A review is given of 52 fractures and fissures of the pedal bone (32 being intra-articular) that were recognised as the cause of lameness in cattle during the previous 5 years. The fractures were observed only in grazing animals and predominantly during the months May and June. On account of the fact that the fracture lines always had a similar course, it was presumed that they had a common underlying cause. 50 fractures were distributed equally in the medial and lateral claws of both forelegs. In 2 cases fractures occurred in the hind legs. The treatment used was to shoe the sound claw of the affected leg, and to this plate was screwed a 4-cm. (1½-inch) thick piece of wood, so raising the fractured claw clear of the ground. The owner was instructed to remove the shoe after 6 weeks. Results were good and only one animal remained lame and was slaughtered. The ability of the animal to move freely at once following shoeing is emphasised, while the recovery process can proceed unhindered.

A.D.W.

Effects of Chicken Body Louse Infestation on Egg Production. GLEES, ELMER E., & RAUN, EARLE S. (1959). *J. Econ. Ent.* **52.** 358.

The authors compared the egg production over a 16-week period of 60 louse-free hens with that of a similar number of birds which were artificially infested with *Menacanthus stramineus*. During the 14 weeks of the experiment, total egg production of the infested birds was reduced by 15 per cent. Differences between the 2 groups became greater as the infestation increased, until during the fourteenth week production by the infested birds was reduced 84 per cent.

There was no difference in weights of the eggs due to the louse infestation.

J. C. W.

NUTRITION CONFERERENCE PROCEEDINGS AVAILABLE IN BOOK FORM

Up-to-date views on the basic principles of feeding stock, together with the lines along which modern research is working, are the basis of *Scientific Principles of Feeding Farm Live Stock*. This book, the proceedings of the conference at Brighton last November, is available from FARMER & STOCKBREEDER, Dorset House, Stamford Street, S.E.1, price 50s.

The conference in which a number of members of the profession took part, recommended that committees be set up to review feeding standards and to convene further conferences from time to time. These recommendations have been accepted by the Agricultural Research Council.

News and Comment

R.C.V.S. AWARDS

The following awards were made by the R.C.V.S. Council at their last Quarterly Meeting:

Sir Frederick Smith and Miss Aleen Cust Research Fellowship: F. A. Harrison, B.V.SC., B.SC., M.R.C.V.S. Mr. Harrison qualified at the University of Liverpool in June, 1957. He will be carrying out studies on the physiology of bile secretion in sheep at the A.R.C. Institute of Animal Physiology, Babraham Hall, Cambridge.

The Fitzwygram Essay Prize: J. M. Bedford, B.A., VET.M.B., M.R.C.V.S. Mr. Bedford qualified at the Veterinary School of the University of Cambridge in 1958 and has recently begun work at the Worcester Foundation for Experimental Biology, Shrewsbury, Massachusetts, having spent the intervening period at the Department of Veterinary Surgery of the University of Bristol. The subject of the essay was "Oestrogens and Androgens—Their Use in Animal Disease and Husbandry."

The following award has been made by the R.C.V.S. Trust:

The Pig Industry Development Authority Senior Fellowship for Research in Pig Health: L. J. Taffs, PH.D., M.R.C.V.S. Dr. Taffs has already held an award of the Royal College, having been given a grant under the terms of the Sir Frederick Smith and Miss Aleen Cust Research Fellowship in September 1956. The research will be carried out in the department of Animal Pathology of the Cambridge School of Veterinary Medicine. This is the first award to be made by the R.C.V.S. Trust.

JURY SERVICE

The Registrar of the Royal College of Veterinary Surgeons would remind all veterinary surgeons and supplementary veterinary register practitioners practising in the United Kingdom that this is the time of year to obtain exemption from jury service. *It must be emphasised that exemption from jury service is not automatic.*

Liability to jury service depends upon inclusion in the local jury book which is compiled each year from the electoral registers. On these registers the names of all persons who are, on October 10th in each year, qualified and liable to serve as jurors are marked with the letter "J."

Members have probably filled up a form recently asking them to give the names of all occupants of their households who are eligible to vote. During the period November 28th to December 12th the lists compiled after the return of these forms will be displayed in town halls, post offices and other public places. They may there be inspected, and if the letter "J" is marked against a member's name and he wishes to obtain exemption from jury service, he must write to the electoral registration officer for his area and point out to him by not later than December 12th that he is exempt.

The authority which should be quoted in the letter is Section 24 of the Veterinary Surgeons Act, 1948, which reads:—

"(1) No member of the Royal College of Veterinary Surgeons, and no person for the time being registered in the Supplementary Veterinary Register, shall if actually practising veterinary surgery be liable to serve on any jury.

"(2) This section shall not extend to Northern Ireland."

OPENING OF THE NEW CAMBRIDGE VETERINARY INVESTIGATION CENTRE

The new buildings of the Cambridge Veterinary Investigation Centre in Madingley Road were formally opened by Princess Frederick of Prussia on Wednesday, October 21st. Mr. J. N. Ritchie, the Chief Veterinary Officer, welcomed the distinguished gathering and conveyed the apologies of Mr. John Hare, the Minister of Agriculture, Fisheries and Food, who was unable to be present that day. Mr. Ritchie then asked Lord Waldegrave to address the meeting, invite Princess Frederick to unveil a commemorative stone, and perform the opening ceremony.

Lord Waldegrave, commenting on the fine new building, said that although it had been erected and equipped by the Government, it would not have been possible to build anything better than the usual utilitarian premises had it not been for the most generous donation from Prince and Princess Frederick. The gift had made it possible for the building to be worthy in style and quality of the site and of the University of Cambridge. Spectacular progress had been made in veterinary science in recent years but there was still much to be done. It was more than ever necessary for veterinary surgeons in private practice to have first class laboratory facilities available to them, and this need was being supplied by the Veterinary Investigation Service of the Ministry of Agriculture. Here at Cambridge all the latest improvements had been incorporated, and students of the School of Veterinary Medicine would also benefit from the close association of the Centre with farmers and livestock owners.

Princess Frederick said she hoped that the new laboratories, and their proximity to the University, would make it possible for many of the disease problems facing the veterinary profession to be tackled one by one on a broad front. In particular, she hoped that the Centre would continue to develop its role in the field of specialist diagnosis to the mutual advantage of the farmer and the veterinary surgeon.

Princess Frederick then walked to the building, unveiled the commemorative plaque, and opened the

main doors with a special key. Together with the platform party, which included the Earl and Countess of Iveagh, Earl Waldegrave (Parliamentary Secretary, House of Lords), Mr. J. N. Ritchie, Professor L. P. Pugh, Dr. A. W. Stableforth, Sir John Winnifrith (Permanent Secretary of the Ministry of Agriculture), Sir Richard Manktelow (Deputy Secretary), Mr. A. J. Stevens (V.I.O., Cambridge), and Mr. I. Forbes (Architect), she was then conducted round the laboratories.

The building itself has been constructed in three main sections round an open-sided courtyard. The main entrance leads to a central corridor which is flanked on either side by administrative offices and laboratories. At the far end are the sterilising and post-mortem rooms, together with the boiler and incinerator houses, which are linked by a covered passage. The second "arm" of the building has been constructed for the housing of animals and for storage purposes, and all three blocks have been faced with Dutch bricks to tone with the buildings of the School of Veterinary Medicine.

After a short interval the general company were invited to inspect the building. Among the many present were:—

Mr. S. L. Hignett (President of the B.V.A.), Sir Henry Willink (Master of Magdalene College), Mr. H. I. Field (Deputy Director, Weybridge—lately S.V.I.O., Cambridge), and Mrs. Field, Mr. C. P. Quick (Assistant Secretary, Animal Health Division, M.A.F.F.), Mr. J. W. Salter Chalker (Chairman, N.F.U. Animal Diseases Committee), Mr. W. G. R. Oates (Registrar, R.C.V.S.), Mr. D. W. Menzies (Deputy Director, V.I. Centres), and members of the academic staff of the School.

PERSONAL

Births

CURTIS.—On October 26th, 1959, at 16 Haslin Crescent, Christleton, Chester, to Marian, wife of Peter Curtis, B.V.SC., M.R.C.V.S., a daughter.

DAVISON.—On October 13th, 1959, to Margaret, wife of Roy S. Davison, M.R.C.V.S., a son, Robert Michael, brother for Nicola, at Sandleford, Newbury.

GIBSON.—On August 27th, 1959, at Princess Elizabeth Hospital, Nairobi, to Shirley (née Thornton) wife of Ian G. Gibson, M.A., VET.M.B., M.R.C.V.S., Veterinary Department, Kenya, a daughter, Catherine Clare.

KEARNS.—On October 19th, 1959, to Heather, wife of Michael Kearns, M.R.C.V.S., at Rosemead, Worlingham, Beccles, a son, Robin Affric.

MASON.—On October 19th, 1959, to Shirley, wife of Roger Mason, B.V.SC., M.R.C.V.S., of Corfe, Taunton, a daughter.

PROCTER.—On October 14th, 1959, to Joan, wife of Garth Procter, B.V.SC., M.R.C.V.S., of 35 Ettrick Avenue, Fleetwood, a second son.

WRIGHT.—On October 20th, 1959, to Nessie (née Gibson), wife of Denis Wright, M.R.C.V.S., of 11 Ashgrove Street, Ayr, a son, Gavin William.

COMING EVENTS

November

4th (Wed.). Fourth Annual General Meeting of the R.V.C. Association at the Royal Veterinary College, London, N.W.1, 5.30 p.m.

6th (Fri.). Meeting of the Shropshire Veterinary Club at the Oak Hotel, Shelton, Shrewsbury, 8 p.m.

11th (Wed.). General Meeting of the Lancashire Veterinary Association at Liverpool, 2.30 p.m.

Meeting of the Southern Counties Veterinary Society at the Royal Hotel, Winchester, 7.30 p.m.

12th (Thurs.). Special Meeting followed by an Ordinary General Meeting of the Central Veterinary Society at the Royal Veterinary College, Camden Town, N.W.1., 6 p.m.

13th (Fri.). Annual General Meeting of the North Wales Division at the Gwydyr Hotel, Bettws-y-Coed, 2 p.m.

General Meeting of the Midland Counties Veterinary Association at Chateau Imprey, Droitwich, 2.30 p.m.

22nd Commemoration Ball of the Royal Veterinary College in the Great Hall, 8 p.m.

18th (Wed.). Meeting of the Scottish Metropolitan Division in the Royal (Dick) School of Veterinary Studies, Edinburgh, 2.30 p.m.

Dinner-Dance of the Western Counties Veterinary Association at the Imperial Hotel, Exeter, 7 p.m.

19th (Thurs.). Annual Dinner-Dance of the V.V.B.F. Northern Region in the Northern Hotel, Aberdeen, 7.30 p.m.

Meeting of the Society of Practising Veterinary Surgeons at the Royal Station Hotel, York, 7.30 p.m.

Annual Dance of the V.V.B.F. County of Ayr Ladies' Guild in Western House, Ayr.

Reception and Dance of the Shropshire Veterinary Club at the Grapes, Bicton Heath, Shrewsbury, 9 p.m.

Dinner-Dance of the Lakeland Veterinary Association at the Hydro Hotel, Windermere, 7.30 p.m.

20th (Fri.). Dinner-Dance of the V.V.B.F. Ladies' Guild, Dumfries and Galloway Division, in Lockerbie House Hotel.

25th (Wed.). Annual Supper Dance of the Scottish Metropolitan Division at the Calton Hotel, North Bridge, Edinburgh, 8 p.m.

26th (Thurs.). Meeting of the B.V.A. Overseas Committee at 7, Mansfield Street, London, W.1, 11 a.m.

Meeting of the Supplementary Veterinary Register Association at 7 Mansfield Street, Portland Place, London, W.1., 2 p.m.

28th (Sat.). Meeting of the Metropolitan Region of the B.S.A.V.A. at 1, Wimpole Street, London, W.1; dinner 7 p.m. for 7.30 p.m.; paper 9 p.m.

December

6th (Sun.). Meeting of the Kenya Veterinary Association at Uplands Bacon Factory and Sports Club, 11 a.m.

B.V.A. COMMITTEE AND COUNCIL MEETINGS IN LONDON

Tuesday, November 3rd—at 7, Mansfield Street
5.00 p.m. Finance Sub-Committee.

Wednesday, November 4th—at 7, Mansfield Street
10.00 a.m. Parliamentary and Public Relations Committee.
11.30 a.m. Farm Livestock Committee.
2.15 p.m. Small Animals Committee.

Thursday, November 5th—at 7, Mansfield Street
10.00 a.m. Veterinary State Medicine Committee.
11.30 a.m. Home Appointments Committee.
2.30 p.m. General Purposes and Finance Committee.

Friday, November 6th—at Connaught Rooms, Great Queen Street, London, W.C.2
10.15 a.m. Council Meeting.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Ayr. Clerkland Farm, Stewarton, Kilmarnock (Oct. 23).
Fife. Newton Farm, Markinch (Oct. 26).
Kent. Great Knell Farm, Ash, Canterbury (Oct. 21).
Staffs. Church Gorse Farm, Kingsley, Stoke-on-Trent (Oct. 22).
Stirling. Powis House, Logie (Oct. 22).

Fowl Pest

Aberdeen. Claymires, Esslemont (Oct. 26).
Bedford. 26 and 32, Oakley Road, Bomham (Oct. 21); New Inn Farm, Great North Road, Stotfold, Arlesey; Molliver Farm, Bromham (Oct. 26).
Berwick. 16, Market Place, Lauder (Oct. 20); Woodend, Duns; Kelloe Mains, Duns (Oct. 24); Smithy House, Blainslie, Lauder (Oct. 25).
Bucks. Yards End, Hardwick, Aylesbury (Oct. 23); Buckingham Road, Hardwick, Aylesbury (Oct. 24).
East Lothian. Hatton Hill, Humbie (Oct. 22); Drem Farm, Drem, North Berwick (Oct. 23).
Gloucs. Wellington Poultry Farm, Wellington Road, Moreton-in-Marsh (Oct. 20); Manor Farm, Great Winchcomb, Cheltenham; North Road Bungalow, Reddings (Oct. 22); Clarkes Piece, Weston-sub-Edge (Oct. 25); The Dairy, Guiting Power; Rectory Farm, Bisley; Cotswold View and Springfield, The Reddings, Cheltenham (Oct. 26).
Kent. Pett Bungalow, Pett Road, Stockbury, Sittingbourne; 2, Bogden Cottage, Marden, Tonbridge (Oct. 21); 15, Courleet Drive, North Heath, Erith (Oct. 22); Rabbit Farm, Staplehurst (Oct. 23); 11, Canterbury Road, Bybrook, Ashford; The Roost, Fawkham, Dartford; Springhead Nursery, Watling Street, Gravesend (Oct. 24).
Lanarks. Auchnairn Farm, Bishopbriggs, Glasgow (Oct. 24).
London. 102, Peckham Hill Street, S.E.15; The Amazon Pet Stores, 3, Amersham Road, New Cross, S.E.14 (Oct. 22).
Norfolk. Clint Green, Yaxham (Oct. 21); Long Pasture, Yaxham; Beech Farm, Yaxham; Rosebank, Norwich Road, Clint Green, Yaxham (Oct. 22); Spring Lane Farm, Yaxham (Oct. 24).
Peebles. White Bridge, Peebles (Oct. 23).
Renfrew. Burnfoot, Potterhill, Paisley; South Barnbeth, Bridge-of-Weir (Oct. 23).
Roxburgh. Greenbraes Cottage, Stirche Mains, Hawick (Oct. 22); Overwells Jedburgh (Oct. 24); Sairnington House, Kelso; Bowden Knowe, Bowden, Melrose (Oct. 25).
Selkirk. Social Service of Church of Scotland, Woodlands, Galashiels (Oct. 22); Cardy Hough, Ashkirk, Jedburgh; Easter, Essenside (Oct. 25).
Warwicks. Whitehall Farm, Alcester (Oct. 22).
Worcs. Grove Farm, Lincombe, Stourport (Oct. 21); Manor Farm, Wyre Piddle, Pershore; Baldwin House, Cow, Honeybourne, Evesham (Oct. 22); Bredon Fruit Farm, Bredon, Tewkesbury; Greville Hall Farm, Evesham (Oct. 23).

Swine Fever

Berks. Coombe End Farm, Whitchurch Hill, Reading (Oct. 26).
Bucks. Berry Farm, Whelpley Hill, Ashley Green, Chesham (Oct. 23); Manor Farm, Shalstone; Dobsons Farm, Fawley Green, Henley-on-Thames; Monkcombe Farm, East Claydon, Bletchley (Oct. 26).
Caernarvon. Maes Cadwgan, Conway (Oct. 26).
Ches. Tolle Mache Farm, Clotton, Tarporley (Oct. 20).
Derbys. Yew Tree Farm, Windley (Oct. 26).
Dorset. Woodside, Christchurch Road, Dudsbury, Wimborne (Oct. 23); Laurels Farm, Netherby, Bridport; Fir Tree Cottage, Hammoon, Sturminster Newton (Oct. 26).
Essex. Roughlands, Little Totham, Malden (Oct. 22); Johnsmead, Blake End, Rayne, Braintree (Oct. 23).
Gloucs. Hillside Farm, Stoke Gifford, Bristol (Oct. 26).
Kent. Broomfield Farm, Throwley, Faversham (Oct. 20); The Bungalow, Swingfield, Dover; Oaklands Farm, Smarden, Ashford (Oct. 21); Rowhill Road, Wilmington, Dartford (Oct. 22); Glen Farm, Row Hill, Wilmington, Dartford; Manor House, Sellindge, Ashford (Oct. 26).
Lancs. Woodside Farm, Houghton Green, Winwick, Warrington (Oct. 20); Wardley House, Church Road, Warton, Preston (Oct. 23).
Leics. Blaby Mill Farm, Mill Lane, Blaby (Oct. 26).
Lincs. Vale Farm, Barrowby, Grantham (Oct. 21); Yew Tree Farm, Skellingthorpe (Oct. 23).
Somerset. Southwood Common Farm, Evercreech, Shepton Mallet (Oct. 23).
Sussex. Fagg Farm, Udimore, Rye (Oct. 20); Hayleigh Farm, West Meston, Hassocks (Oct. 23).
Warwicks. Myton Farm, Myton Road; High Ledge Farm, Knightcote, Leamington Spa; Lodge Farm, Woolscote, Grandborough, Rugby (Oct. 22); Black Bank Inn, Bedworth, Nuneaton; No. 4 Smallholding, Baginton, Coventry; The Folly, Napton, Rugby (Oct. 26).

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN
Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period		Anthrax	Atrophic Rhinitis	Foot-and-Mouth	Fowl Pest	Sheep Scab	Swine Fever
16th to 30th Sept., 1959		14	—	—	39	—	81
Corresponding period in	1958	7	—	—	34	—	34
	1957	3	—	24	39	—	37
	1956	28	—	17	29	—	27
1st Jan. to 30th Sept., 1959		181	1	9	540	—	925
Corresponding period in	1958	119	5	114	537	—	990
	1957	257	6	64	620	—	727
	1956	1,146	8	116	516	—	592

Letters to the Editor

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

Wine-Tasting

Sir,—May I say a word of appreciation for your feature on the Wine-Tasting held as one of the social events of Congress (would I had been there!). But may I please ask you in future to give the references to your apt quotations. This is a duty which falls to all who write to a scientific journal.

Perhaps, however, it was due to the specific action of sherry: "It ascends me to the brain; dries me there all the foolish and dull and crudy vapours that environ it, makes it apprehensive, quick, forgetive, full of nimble fiery and delectable shapes; which deliver'd over to the voice, the tongue, which is the birth, becomes excellent wit."

I am, Sir,

Yours faithfully,

BRENDAN HALPIN.

Ministry of Animal Health and Forestry,
Veterinary Division,
Katsina, Northern Region of Nigeria.
October 21st, 1959.

References

ANON (1959). *Vet. Rec.* **71**. 30. 622-3.
SHAKESPEARE, W., & BACON, F. (1623). "Henry IV," part 2, Act IV, Sc. 2, lines 105-10.

[Alas! Loaded down by the iron fetters of duty, we were but a spectator of the Tasting.—EDITOR.]

Strengthening Plaster Casts

Sir,—Recently I dealt with the case of a cow with a fractured metatarsal. With the object of strengthening the plaster of Paris cast which I applied, and of making it weatherproof, I made up a paste of powdered fibre glass and resin which I applied with a knife to the surface of the dried cast. It adhered well, was dry within about 15 minutes, and appeared to add considerably to the strength. This technique may be of general interest. I think that it might even defeat the determined dog trying to tear off a plaster with his teeth. It is easy to apply, sets very hard indeed, and the cost is not prohibitive. In the case I mentioned, I used rather less than half the powdered fibre provided from a pack of proprietory Glass Fibre No. 1 Kit* which is available from most garages and which costs less than £1.

Yours faithfully,

R. H. MUIRHEAD.

10 Foalin,
Strath,
Gairloch.
October 20th, 1959.

* Holts.

An Unusual Injury

Sir,—I recently sustained an unusual injury during the course of daily practice.

I had previously empirically treated an Ayrshire cow for alleged infertility, but owing to an inability of the anus to dilate sufficently to admit my forearm, I was unable to palpate the genital tract. She subsequently came into oestrus several times, and as she was a valuable animal I determined to try again. I lubricated my forearm very thoroughly, and as before it was not difficult to insert my hand and wrist into the rectum; my forearm, which is fairly thick, met with considerable resistance. I accordingly thrust my arm within the rectum; this required considerable strength, was very painful, and took the better part of 2 minutes. The anus was so tight round my upper arm that I had little power in my fingers. Difficulty was also experienced in removing my arm. Within about 15 minutes of this procedure my entire arm became visibly swollen below the elbow, was extremely painful, and I had very little muscular power. Most of the swelling and the worst of the pain subsided in about 48 hours, but for the next 3 weeks I was quite unable to do anything such as carry a bucket a water with this arm and any such exertion caused considerable muscular pain. After about 2 weeks a severe discoloration, varying from a deep ruby red, through purple to blue was visible along my forearm in a spiral band, which ran from the point of my elbow inwards and downwards to my wrist. It was some 4 weeks after this incident before I regained full use of my arm.

The cow appeared to suffer no inconvenience as a result of this interference. A cowman in the practice told me he had seen a similar misfortune occur some years previously with another veterinary surgeon.

Yours faithfully,

OLAF SWARBRICK.

The Cricket Field,
Fontwell,
Arundel, Sussex.
October 20th, 1959.

Calfhood Vaccination

Sir,—Since August I have had in my "awaiting attention" file, a copy of the B.V.A. 1959 Annual Report. Glancing through this report I find reference to the Calfhood Vaccination Scheme—discussion with the Ministry re some revision. This brings me right up to date for I am currently dealing with a problem of contagious abortion in a herd the owner of which has almost religiously adhered to the application of this Scheme. Calfhood vaccination has never been missed. Sometimes, indeed, it has inadvertently been duplicated. In tune with then current opinion S 19 vaccination has been repeated at a later stage of the cow's life.

Recent investigation into the abortion pictures in this herd—about 40 to 50 cows—was set on foot after 7 abortions in one year and 7 cows found to be secreting demonstrable virulent *Br. abortus* organisms in the milk.

If ever agonising reappraisal were called for it is in this connection.

I can see no alternative to blood testing calves due for calfhood vaccination. Elimination of reactors and a studious avoidance of vaccination.

Yours faithfully,

Orchard House, J. P. PICKERING.
Priestpopple,
Hexham,
Northumberland.
October 14th, 1959.

Orthopaedic Surgery in Exotic Mammals

Sir,—My only venture into orthopaedic surgery in an exotic mammal had the same unfortunate outcome as in the case of Miss Fardell's Green Monkey. Although I think shock was a factor I have to admit to a silly error in computing anaesthetic dosage, which I am sure was in part responsible for the animal's death.

The patient was a Bush Baby, referred to me by a colleague for attempted pinning of a fractured left femur. Reduction had been attempted and a plaster cast applied but subsequent radiography showed clearly that reduction had not been achieved and that the only hope of obtaining it would be by some means of internal fixation. The calibre of the femur, as judged from the X-ray, was approximately that of a stick of spaghetti and my first problem was to find a suitable "pin." A very helpful member of the staff of the London Splint Co. suggested that a Kirschner wire would be appropriate and this did turn out to be ideal.

The second problem was anaesthesia and here I sought the advice of Mr. Oliver Graham-Jones, who advised intraperitoneal pentobarbitone sodium, estimated at the usual rates. The Bush Baby weighed a shade over 4 oz. and I decided upon 1/16 gr. pentobarbitone sodium as the dose (I estimated at about ¼ gr. per lb. as for a very small dog) and this was injected intraperitoneally. Excellent anaesthesia resulted. The femur was fractured transversely at a level slightly proximal to mid-shaft; pinning was exceedingly easy and a perfect reduction and apposition was obtained.

During a routine examination of the patient some 3 hours later it was noticed that the right femur felt oddly loose and, on re-examining the X-ray it was found that there was a fracture just visible in the proximal inch of the femur which was barely included in the film. Permission was sought and obtained to pin the second limb. Anaesthesia had lightened slightly but was still adequate and the second femur was pinned as easily as the first. From this point, however, anaesthesia did not lighten noticeably and I was told the Bush Baby (which had been returned to its owner by the attending veterinary surgeon) had died during the night.

I worried and puzzled for some time over the cause of death as, although I am sure surgical shock from the second operation was a factor, I felt my anaesthesia was in some way to blame. Even allowing that I should have estimated the dose at 1/5 gr. per lb., I could not believe my assessment was a serious over-dosage. Twenty-four hours later light dawned. We had weighed the Bush Baby with its plaster cast on and had made no allowance for it! This probably weighed an ounce, so my dose of pentobarbitone may have been excessive by as much as 25 per cent.

I still feel that attempts at radical surgery in these exotic pets should continue but it seems probable from letters so far published that safe anaesthesia is the crux of the matter in dealing with these less usual species.

Yours faithfully,

78 Brentway, JOAN O. JOSHUA.
Finchley, N.3.
October 6th, 1959.

The Colonial Veterinary Service

Sir,—Twenty-one years ago, Mr. R. S. Marshall loosed off some marvellous thunder flashes on behalf of the personnel of the Colonial Veterinary Service and I don't suppose his interest in the Service has lessened.

The "veterinary establishment" should consider now a symbiotic relationship between the Animal Health Division and H. M. Civil Service (Overseas Service Division) veterinary services. This would cut out the hopeless procedure of a recruitment panel from one generation trying to recruit members of the next generation with that "Pioneering spirit" for lousy jobs.

After learning the technique of Government service in this country for a few years, a veterinary officer could then have a period of service overseas and return to the Animal Health Division.

Non-expatriate officers would also be saved the embarrassment of watching fledgelings becoming acclimatised or not as the case may be.

Yours faithfully

Fishers Tenement, A. W. HART.
Tincleton,
Dorchester, Dorset.
October 25th, 1959.

A New Veterinary Club

Sir,—May I, through the courtesy of your columns, draw the attention of all veterinary surgeons to the formation of the Staffordshire and Derbyshire Veterinary Club?

The main object of this club is to promote and foster good relations between members and provide an opportunity for discussing our problems amongst ourselves.

The next meeting of the club will be held at the White Hart Hotel, Uttoxeter, on November 26th, 1959, at 7.30 p.m. for 8 p.m. when it is proposed to adopt a constitution. An invitation is extended to all veterinary surgeons who would like to attend.

Yours faithfully,

S. M. C. JONES.
Hon. Sec.

90 Spring Terrace Road,
Burton-on-Trent.
October 27th, 1959.